

# ANAR 120: Documenting Climate Change: Past and Present

Winter 2022

MWF 3:00-3:50 PM, Sequoia 142 (ACS Computer Lab)

**Instructor: Dr. Ian Jones**

**E-Mail: [ijones@ucsd.edu](mailto:ijones@ucsd.edu)**

**Office: SSB 297**

**Student Hours: MW 1-2 PM (or by appointment)<sup>1</sup>**

**Coffee Hour: F 1-2 PM, Art of Espresso (Mandeville Cart)**

**Lecture Zoom Meeting ID: 992 9563 2459**

**Lecture Zoom Password: SoreqCave**

**Lecture Zoom Link:**

**<https://ucsd.zoom.us/j/99295632459?pwd=N2FPTjJlORC9obE1YVDAxNVVGUxodz09>**

**Student Hours/Coffee Hour Zoom Meeting ID: 562 825 340**

**Student Hours/Coffee Hour Zoom Link: <https://ucsd.zoom.us/j/562825340>**

Required Textbook: Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge, UK: Cambridge UP. [DLC]

Available at the UCSD Bookstore (and various places online).

Additional required readings are available on Canvas.

This course assumes basic familiarity with the core principles and practices of archaeology. If you have not yet taken an introductory archaeology course or would like a refresher, I would recommend Shafer-Elliott, Cynthia, ed. 2016. *The 5 Minute Archaeologist in the Southern Levant*. Sheffield: Equinox. It's an excellent and inexpensive collection of short chapters (each one is meant to take about five minutes to read), each of which provides an accessible answer to a specific question about archaeology. Some of the questions are simple, some are complex, and some you might not even know you have. (You can also pick up used copies of the classic Renfrew and Bahn *Archaeology* textbook for about \$5.) The course also assumes some basic computing knowledge (e.g. how to download and install software), but it does NOT assume or require any previous experience with R, programming, or statistics.

Although I won't be assigning it as reading, I would also recommend bookmarking Venables, W. N., D. M. Smith, and the R Core Team. 2020. *An Introduction to R: Notes on R: A Programming Environment for Data Analysis and Graphics*. Version 4.0.2.

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<sup>1</sup> I have an open-door office policy, as well. If you see my door open and I'm in the office, feel free to stop by.

(<https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>). This is a useful reference for some of the core functions of R, which we'll be using heavily in this course, and can be a useful supplement to the DLC textbook.

## **Course Description**

Although anthropogenic climate change is a modern problem, the Earth's climate has never been stable, and humans have had to adapt to numerous climatic shifts over the several hundred thousand years our species has existed. Studying this past climate change helps us better understand the environmental history of our species and contextualize our current climate crisis. This course will help familiarize students with the methods that archaeologists, working in collaboration with botanists, geologists, chemists, zoologists and other scientists, use to document shifting climate in the past and present day, in addition to training on geospatial data sets. Lectures will introduce students to the methods used to collect environmental data relevant to climate change and the types of questions archaeologists use these data to answer, and labs will guide students through the basics of working with these data in R, a powerful (and free!) statistical programming language.

## **Prerequisites**

Upper division standing.

## **Course Learning Outcomes**

Students completing this course will be able to:

- 1) Define, explain, and discuss key terms and concepts relevant to the archaeological and anthropological study of climate change
- 2) Explain key methods used in the collection and processing of environmental archaeological data
- 3) Summarize the major climate changes that have occurred during the several hundred thousand years since the emergence of *Homo sapiens*
- 4) Critically assess applications of environmental data to questions of climate change in anthropological archaeology
- 5) Read, understand, summarize, and critique scientific and social scientific journal articles
- 6) Explain the relevance of climate change archaeology to the problem of modern anthropogenic climate change
- 7) Perform basic data analysis and graphical tasks in R

## **Grading**

Grades will be calculated out of a total of 100 points.

Reading reflections: 20%  
Labs: 60%  
Final: 20%

In this course, grades are an assessment of active scholarly engagement with a set of requirements (laid out in a lab guide or prompt). I'm not a believer in punitive assessment, however, and don't view grades as a reflection of "points lost" from an ideal A+, representing exact conformity to the requirements of the prompt. It would be more productive to think about grades as representing a comparison between your work and an ideal B-, conceived as an assignment that satisfactorily meets the requirements of the prompt.

### **Canvas and Zoom**

<http://canvas.ucsd.edu>

The course Canvas page contains a copy of the syllabus, electronic course readings, lecture slides, lab prompts and other lab resources, and grades. For information on using Canvas, see: <https://edtech.ucsd.edu/students/index.html>

Class meetings, student hours, and coffee hours will take place over Zoom for at least the first two weeks of the quarter. For information on using Zoom, see: <https://blink.ucsd.edu/technology/file-sharing/zoom/index.html>

If you do not have consistent access to the required technology to fully access remote learning options, please use this form to request a loaner laptop for the period during which you will be learning remotely:  
<https://eforms.ucsd.edu/view.php?id=490887>

### **Lectures and Recording**

The class periods in this course will differ depending on the day of the week (with some modifications on weeks with holidays). Monday's lectures, called "concept lectures," will introduce concepts from the archaeology of climate change, the problems and questions archaeologists face in studying these concepts, and the kinds of data archaeologists use to address these questions. Wednesday's lectures, called "method lectures," will introduce statistical and other methods that can be used in answering the problems introduced in that week's concept lecture, and how to use these methods in R. Fridays we will not have lectures, and will instead have a lab period where you will use R to apply that week's methods to a dataset or several datasets available on the course Canvas page.

It is possible that we will be returning to in-person instruction in Week 3 and will be able to use the Sequoia 142 computer lab, but until then we will be meeting on Zoom. For the first two weeks of the quarter, Monday lectures (concept lectures) and Wednesday lectures (method lectures) will be delivered at the scheduled class

time over Zoom. Attendance during the Zoom meeting is encouraged but not required, and each lecture will be recorded and made available asynchronously on Canvas (by the following day, at the latest; Zoom and Kaltura can sometimes take several hours to process videos once recording is finished). Any questions, discussion, etc. will also be included in this recording. Friday there will be no lecture, but I will be available during the scheduled lab time to provide any assistance you may need with the lab assignment. (As you probably realize, there are several holidays this quarter that will affect this general schedule. See the entries for those weeks on the course schedule for information on what we'll be doing those weeks.) You are free to use the recorded lectures for purposes related to the course, but you may not redistribute them without written permission.

### **Student Hours and Coffee Hours**

What I call “student hours” you’ve probably heard called “office hours” in most other classes. Student hours are times I’ve specifically set aside to talk to students. You won’t be interrupting anything else if you stop by, because I intentionally don’t schedule anything else during these times. In general, these will be one-on-one meetings, but you’re also free to come as a group if some of you all want to talk about the same thing (please keep social distancing restrictions in mind). Usually, discussions during student hours will be about some aspect of the course, but this isn’t the only thing we can talk about. If you want to talk about anthropology in general, or your career, or ‘90s punk bands, or something else, I’m happy to talk to you about that, too (but bear in mind I might have to cut some of these conversations a bit short if a lot of students need to talk to me about the course). You don’t need an appointment for student hours, but you’re free to set one up if you want (and if you can’t make student hours but would still like to meet with me, feel free to email me to set up an appointment).

Coffee hours, by contrast, will be communal meeting times. I won’t have a set agenda for these, so, for the most part, we can talk about whatever people want to talk about. If you want to discuss some aspect of the course in more detail than we were able to in lecture, feel free to bring that up during coffee hours. If you just want to hang out and talk about your week, feel free to do that instead. If you just want to hear me talk about the thrill and excitement of pottery analysis, you can get me started on that, too. (Coffee hours are subject to cancellation depending on the trajectory of the ongoing pandemic, but during the first two weeks of the quarter will be held via Zoom.)

### **Readings**

The readings for each class session are listed **below** the date and title of that session in the schedule. It is your responsibility to complete the readings for each session **before** the beginning of class, as lectures will build on and assume knowledge of the assigned readings. If a date has no reading listed below, you do not have any readings for that day. Readings from David L. Carlson’s *Quantitative Methods in*

*Archaeology Using R* are listed following the abbreviation [DLC] and online readings available on Canvas are listed following the abbreviation [C].

## Reading Reflections

You will submit a short (1-2 paragraph) reading reflection **for one concept reading** (of your choice, but **not** including the textbook method reading) each week. This reflection does not need to be particularly long or detailed, but must answer three questions: 1) What did you find most interesting about this reading, and why? 2) What did you find most confusing about this reading, and why? And most importantly 3) Why do you think I assigned this reading? Remember to keep your answers relevant to the course. For full credit, you should answer these questions with some reference to concepts and information from the lectures and other course readings. **Completed reflections are always due Tuesday (by 11:59 PM)**. Reading reflections will be scored out of 2 points. 2 points will be given to complete, well-articulated reflections; 1 point will be given to incomplete reflections or reflections based on incorrect information; 0 points will be given for missing reflections.

## Labs

During the course, you will be responsible for completing 10 lab assignments. Labs will be assigned on Fridays, and you will have a lab period in which to work on them. You are not required to complete them during the assigned lab period, but I will be available during this period to answer any questions you might have (hopefully in-person after Week 2, but on Zoom until then). If you don't complete the labs during this period, you will need to finish them on your own time. (If you have difficulty completing the labs on time, please see me during student hours to discuss strategies for completing them more efficiently.) **Completed labs are always due the following Friday at 11:59 PM.**

Each lab will be scored out of 6, with the point breakdown given on each prompt. Each answer will be graded according to the following rubric:

*Excellent:* Full credit. In addition to basic factual answers, you also demonstrate an understanding of how the lab connects to multiple concepts we are learning/have learned.

*Correct:* 2/3 credit. You provide only basic, factual answers.

*Incorrect attempt:* 1/3 credit. You provide an answer, but it is incorrect, or you have confused important concepts or terms.

*No attempt:* No credit.

You are welcome to discuss the labs during lab times, student hours, and with one another. You must, however, **always complete your own work**. Any evidence that you have copied answers directly from another person will result in loss of credit **for both people**.

## Electronics

As a lab course, you will be required to use a computer during Friday lab sessions. You are welcome to use a laptop or tablet (or a lab computer) during lecture periods for the purposes of taking notes and consulting course readings, provided it doesn't prove to be a distraction. In other words, you are **not** free to watch TikToks during class (unless they're really funny [but then you have to show all of us]). This distracts not only you, but also the people around you, and this is not fair to them. Phones should be silenced during class (I understand that sometimes it may be important not to miss a call, and in these cases, it's fine to leave your phone on and leave class to take the call).

No audio or video recording of lectures is permitted unless authorized by the Office for Students with Disabilities (OSD) and cleared with me beforehand. I will post all lecture slides to Canvas before each class period, and if you miss something (or something is unclear), please don't hesitate to ask me to clarify.

During the first two weeks of the course, you will need to have access to a computer capable of running Zoom, R, and RStudio. In practice, this includes most relatively recent computers running Windows, MacOS, or Linux. A Chromebook will *probably* also work, but if you're using a Chromebook, please get in touch with me as soon as possible so we can ensure that it will work for this course. Again, if you do not have consistent access to a computer meeting these criteria, please use this form to request a loaner laptop for the period during which you will be learning remotely: <https://eforms.ucsd.edu/view.php?id=490887>

## Expected Workload

According to UCSD policy, you should expect to spend three hours working on a course each week per unit hour of credit. As a four-unit course, students in this class should expect to spend a minimum of 12 hours per week engaged in learning. In this course, three of those hours per week will be spent on lecture and labs, which means that **you should plan to spend *nine* hours per week on this course outside of our scheduled meeting times**. That time will be spent primarily on course readings, reading reflections, lab assignments, and the final.

## Late work policy

As mentioned above, I'm not a fan of punitive assessment. Nonetheless, deadlines can be quite valuable. First, deadlines can be very useful motivators for getting work done (if you're anything like me, anyway). Second, submitting your work on time helps me keep up with grading and generally makes my life easier. I recognize, though, that you all have lives, and that those lives (especially now!) can be complicated. There are no late penalties in this course, but this comes with additional responsibility. If you need to submit an assignment a few days late, that's no problem. If this turns into more than two or three assignments, or you need to

submit an assignment more than a week late, you'll need to talk to me during office hours (or make an appointment) to receive credit. I'm not going to pry into the details of your personal life, I don't need a doctor's note, etc., but I really want all of you to do all of the assignments for this course, and sometimes that requires talking about barriers to getting work done and brainstorming strategies for catching up.

### **Attendance, Participation, and Course Expectations**

It is your responsibility to prepare for and attend each class meeting. If you miss a class, you are still responsible for that material. Pending updates on in-person instruction after Week 2, attendance of lectures and lab sessions will be required, but things are not even close to being back to normal yet, and I understand there are times when absences will be unavoidable. **Please do not attend class if you are feeling sick.** As with the late work policy, if you have to miss one or two days of class, that's not a problem; you don't even need to tell me. If you need to miss more than this, please let me know so that we can discuss strategies for keeping up with the course material.

During Weeks 1 and 2, instruction will be conducted remotely via Zoom. Attendance of synchronous Zoom lectures and lab sessions is not required, but if you are unable to attend the synchronous lecture, you are still responsible for that day's material.

If you're able to attend synchronous lectures, participation in the form of questions and discussion is strongly encouraged (and even more so during coffee hours). To that end, having the course material (readings, etc.) in front of you during lectures is useful (your pet does not count as course material [obviously I still want to meet them, though]).

### **Communicating with Me/Email**

As you've probably noticed, your professors often think of emails as an electronic version of paper letters and expect that they should follow a similar etiquette. This means that we generally expect emails to include a subject line, salutation, body, and closing. There's a logic to each of these elements (the subject line gives me a general idea of what the email is about, the salutation indicates that you know who I am, the body tells me why you're emailing, and the closing tells me who you are), so it's a good idea to include each of them, and again, most of your professors will expect this. I will respond to all e-mails within 36 hours. Realistically, it will almost certainly be sooner than that, but there are several times during the quarter when I might need the full 36 hours to respond. Keep in mind, as well, that it is easier for me (and usually more useful to you) to answer long and/or complicated questions during student hours.

### **Are you reading this?**

If you are, I want you to do me a favor. Send me a link to something you're really into right now. It could be a YouTube video of a song you have on repeat, your favorite meme, a clip from your favorite show, etc. It's not required, but it will show me that you read the syllabus, so that's something.

### **Students with Disabilities**

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter (paper or electronic) issued by the Office for Students with Disabilities (<http://osd.ucsd.edu/>). Students are required to discuss accommodation arrangements with their instructor (i.e. me) and the Department of Anthropology's OSD liaison **in advance** of any exams or assignments. Students authorized to receive reasonable accommodations should discuss their needs with me during office hours to ensure confidentiality. For additional information, contact the Office for Students with Disabilities: (858) 534-4382; email: [osd@ucsd.edu](mailto:osd@ucsd.edu); website: <http://osd.ucsd.edu>.

### **Emergency Preparedness**

Please review the Campus Emergency Preparedness website for information on campus emergency procedures: <http://blink.ucsd.edu/go/emergencyplanning>

UC San Diego will be posting updates on the current campus situation to <https://coronavirus.ucsd.edu/>, and it is a good idea to check this site regularly.

### **Masking Policy**

UCSD is requiring all people on campus to wear masks in indoor spaces, meaning masks will be required in class. UCSD recommends wearing a particulate-filtering respirator meeting either N95 or KN95 guidelines. Please note that UCSD does **not** consider single-layer cloth masks sufficient to be considered masked in indoor spaces.

### **Academic Integrity**

Plagiarism and cheating are very serious offenses, with serious negative consequences for your academic career. Plagiarism includes both quoting someone without giving a citation and also using someone else's ideas without citing them. It is your responsibility to be familiar with and abide by UCSD's [Policy on Integrity of Scholarship](#), as well as your rights and responsibilities according to the [UCSD Student Conduct Code](#). In this course, you are expected to present your own original words and ideas in writing assignments, exams, and class discussions. You are welcome and encouraged to discuss course material with your classmates, but you may *not* present other students' answers as your own. For written assignments, any words or ideas you adopt from another sources (whether verbatim or paraphrased) must be properly credited through citation. If you have any questions about

plagiarism or how to properly cite sources, don't hesitate to ask me. That's what I'm here for.

For additional information, see <https://academicintegrity.ucsd.edu/faq/index.html>

**Course Schedule (*subject to change*):**

**Week 1**

***Mon., Jan. 3***

**Lecture:** Introduction to the course

Introduction to the archaeology and anthropology of climate change

**Reading: [C]** Rockman, Marcy, and Carrie Hritz. 2020. "Expanding use of archaeology in climate change response by changing its social environment." *Proceedings of the National Academy of Sciences* 117(15): 8295-8302.

***Weds., Jan. 5***

**Lecture:** Introduction to R

**Reading: [DLC]** Ch. 1-2 (pp. 1-35)

***Fri., Jan. 7***

**Lab 1:** Installing R and using some basic functions

**Week 2**

***Mon., Jan. 10***

**Lecture:** Chronology and dating

**Reading: [C]** Guilderson, Tom P., Paula J. Reimer, and Tom A. Brown. 2005. "The Boon and Bane of Radiocarbon Dating." *Science* 307(5708): 362-364.

**[C]** Blaauw, Maarten, and J. Andrés Christen. 2005. "The Problems of Radiocarbon Dating." *Science* 308(5728): 1551-1553. (includes response by Guilderson, et al. Please read that, too.)

***Weds., Jan. 12***

**Lecture:** Radiocarbon calibration

**Reading:** [DLC] Chapter 3 (pp. 36-64)

***Fri., Jan. 14***

**Lab 2:** Calibrating radiocarbon dates in OxCal and R

### **Week 3**

***Mon., Jan. 17 (MARTIN LUTHER KING, JR. HOLIDAY)***

**Lecture:** MARTIN LUTHER KING, JR. HOLIDAY – NO LECTURE

***Weds., Jan. 19***

**Lecture:** Stratigraphy and Bayesian modeling of radiocarbon dates

**Reading:** [DLC] Ch. 4 (pp. 65-84)

[C] Harris, Edward C. 1979. "The laws of archaeological stratigraphy." *World Archaeology* 11(1): 111-117.

[C] Harris, Edward C. 2014. "Archaeological Stratigraphy: A Paradigm for the Anthropocene." *Journal of Contemporary Archaeology* 1(1): 105-109.

***Fri., Jan. 21***

**Lab 3:** Modeling radiocarbon dates in OxCal and R

### **Week 4**

***Mon., Jan. 24***

**Lecture:** Archaeobotany and climate archaeology

**Reading:** [C] Anchukaitis, Kevin J. 2017. "Tree Rings Reveal Climate Change Past, Present, and Future." *Proceedings of the American Philosophical Society* 161(3): 244-263.

[C] Castillo, Cristina C., Charles F. W. Higham, Katie Miller, Nigel Chang, Katerina Douka, Thomas F. G. Higham, and Dorian Q. Fuller. 2018. "Social Responses to Climate Change in Iron Age north-east Thailand: new archaeobotanical evidence." *Antiquity* 92(365): 1274-1291.

***Weds., Jan. 26***

**Lecture:** Dendrochronology and tree ring sequences

**Reading:** [DLC] Ch. 5 (pp. 85-125)

**Fri., Jan. 28**

**Lab 4:** Dendrochronology and rainfall data in R

### **Week 5**

**Mon., Jan. 31**

**Lecture:** Ice cores: atmospheric carbon and pollution data

**Reading:** [C] Indermühle, A., et al. 1999. "Holocene carbon-cycle dynamics based on CO<sub>2</sub> trapped in ice at Taylor Dome, Antarctica." *Nature* 398: 121-126.

[C] McConnell, Joseph R., et al. 2018. "Lead pollution recorded in Greenland ice indicates European emissions tracked plagues, wars, and imperial expansion during antiquity." *Proceedings of the National Academy of Sciences* 115(22): 5726-5731.

[C] Siegenthaler, Urs, et al. 2005. "Supporting evidence from the EPICA Dronning Maud Land ice core for atmospheric CO<sub>2</sub> changes during the past millennium." *Tellus* 57B: 51-57.

**Weds., Feb. 2**

**Lecture:** Working with Antarctic ice core data

**Reading:** [DLC] Ch. 6-7 (pp. 126-158)

**Fri., Feb. 4**

**Lab 5:** Ice core data in R

### **Week 6**

**Mon., Feb. 7**

**Lecture:** Stable isotope analysis and climate

**Reading:** [C] Bar-Matthews, Miryam, and Avner Ayalon. 2004. "Speleothems as Paleoclimate Indicators, a Case Study from Soreq Cave Located in the Eastern Mediterranean Region, Israel." In *Past Climate Variability through Europe and Africa*, edited by R. W. Battarbee, et al., 363-391. Dordrecht: Kluwer.

[C] Masi, Alessia, Laura Sadori, Giovanni Zanchetta, Ilaria Baneschi, and Marco Giardini. 2013. "Climatic interpretation of carbon isotope content of mid-Holocene archaeological charcoals from eastern Anatolia." *Quaternary International* 303: 64-72.

**Weds., Feb. 9**

**Lecture:** Working with stable isotope data

**Reading:** [DLC] Ch. 8 (pp. 159-189)

**Fri., Feb. 11**

**Lab 6:** Working with carbon and nitrogen stable isotopes in R

### **Week 7**

**Mon., Feb. 14**

**Lecture:** The ocean: sea level reconstruction, marine isotopes, and more

**Reading:** [C] Clark, Jorie, Jerry X. Mitrovica, and Jay Alder. 2014. "Coastal paleogeography of the California—Oregon—Washington and Bering Sea continental shelves during the latest Pleistocene and Holocene: implications for the archaeological record." *Journal of Archaeological Science* 52: 12-23.

[C] Galili, Ehud, Jonathan Benjamin, Vered Eshed, Baruch Rosen, John McCarthy, and Liora Kolska Horwitz. 2019. "A submerged 7000-year-old village and seawall demonstrate earliest known coastal defence against sea-level rise." *PLoS ONE* 14(12): e0222560.

[C] Rick, Torben C., Jon M. Erlandson, Nicholas P. Jew, and Leslie A. Reeder-Myers. 2013. "Archaeological survey, paleogeography, and the search for Late Pleistocene Paleocoastal peoples of Santa Rosa Island, California." *Journal of Field Archaeology* 38(4): 324-331.

**Weds., Feb. 16**

**Lecture:** Working with sea level and river flood data (and more isotopes!)

**Reading:** [DLC] Ch. 9 (pp. 190-215), skim Ch. 16 (pp. 349-378)

**Fri., Feb. 18**

**Lab 7:** Sea levels, oxygen isotopes, and more in R

## Week 8

**Mon., Feb. 21 (PRESIDENTS' DAY HOLIDAY)**

**Lecture:** PRESIDENTS' DAY HOLIDAY – NO LECTURE

**Weds., Feb. 23**

**Lecture:** Zooarchaeology, animals, and climate change

**Reading:** [DLC] Ch. 10 (pp. 219-243)

[C] Belmaker, Miriam. 2017. "The Southern Levant During the Last Glacial and Zooarchaeological Evidence for the Effects of Climate-Forcing on Hominin Population Dynamics." In *Climate Change and Human Responses: A Zooarchaeological Perspective*, edited by Gregory G. Monks, 7-25. Dordrecht: Springer.

**Fri., Feb. 25**

**Lab 8:** Faunal datasets and zooarchaeology in R

## Week 9

**Mon., Feb. 28**

**Lecture:** Microarchaeology: palynology, phytoliths, and microbotany

**Reading:** [C] Hunt, Chris O., David D. Gilbertson, and Hwedi A. El-Rishi. 2007. "An 8000-year history of landscape, climate, and copper exploitation in the Middle East: the Wadi Faynan and the Wadi Dana National Reserve in southern Jordan." *Journal of Archaeological Science* 34: 1306-1338.

[C] Langgut, Dafna, Israel Finkelstein, and Thomas Litt. 2013. "Climate and the Late Bronze Collapse: New Evidence from the Southern Levant." *Tel Aviv* 40: 149-175.

**Weds., Mar. 2**

**Lecture:** Integrating pollen data into analyses

**Reading:** [DLC] Ch. 12 (pp. 265-278)

**Fri., Mar. 4**

**Lab 9:** Introductory palynology in R

## Week 10

***Mon., Mar. 7***

**Lecture:** Bringing it all together: integrated studies of climate change

**Reading: [C]** Gaastra, J. S., T. L. Greenfield, and H. J. Greenfield. 2020. "Constraint, complexity and consumption: Zooarchaeological meta-analysis shows regional patterns of resilience across the metal ages in the Near East." *Quaternary International* 545: 45-62.

**[C]** Hegmon, Michelle, and Matthew A. Peeples. 2018. "The human experience of social transformation: Insights from comparative archaeology." *PLoS ONE* 13(11): e0208060.

***Weds., Mar. 9***

**Lecture:** Building on statistical approaches to multiple lines of evidence: Correspondence Analysis

**Readings: [DLC]** Ch. 13 (pp. 279-295)

***Fri., Mar. 11***

**Lab 10:** Correspondence Analysis in R

**Final Due: Weds, Mar. 16, 11:59 PM**